

REMARKS

Claims 1-9, 11-28, and 30-34 are now present in this application. Clarifying amendments have been made to claim 20 to address the informalities raised in this Office Action. Further clarifying amendments have been made to claims 1, 4, 9, 11-14, 16, 20-23, 27, 28, and 30-34 and dependent claims 10 and 29 have been canceled without prejudice or disclaimer to the subject matter contained therein in view of the clarifying amendments made to their base claims 1, 16 and 22 respectively. Accordingly, reconsideration and allowance of amended claims 1-9, 11-28, and 30-34 in the present application are earnestly solicited in view of the following remarks.

Claim 20 stands objected for an informalities noted in lines 1 and 2 thereof. Specifically, the informalities are directed to insufficient antecedent basis for the limitation "the acceleration/deceleration column." Claim 20 has been amended to address the noted informalities and it is respectfully requested that the objection to claim 20 be reconsidered and withdrawn.

Claims 1, 2, 4, 5, 10, 16, 17, 19, 20, 22, 25 and 29 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,573,510 to Vella, claims 3, 8, 9, 11, 12, 18, 26-28, 30 and 31 stand rejected under 35 U.S.C. § 103 (a) by Vella, and claims 6 and 7 stand rejected under 35 U.S.C. § 103 (a) by Vella in view of U.S. Patent No. 4,847,504 to Aitken. These rejections are respectfully traversed.

Claims 1, 16 and 22 of the present application recite an ion implantation system and method comprising generating an ion beam by an ion beam source, passing the ion beam through an electrode or housing, and introducing dopant and neutralizing gases from first and second dopant gas supplies. The first dopant gas supply is connected to the ion beam source for introducing the dopant gas to the ion beam and the second neutralizing gas supply introduces the neutralizing gas near the electrode for neutralizing the space charge of the ion beam. The second neutralizing gas increases the neutrality of the ion beam generated from the first dopant gas supply so that divergence and expansion of the beam is prevented. This is particularly important for implantation processes using low energy beams in forming doped regions having shallow depths. Typically, the ion beam source

generates an ion beam with a net positive charge. By introducing the neutralizing gas, atoms of the secondary gas collide with the ions within the beam to create electrons and positive ions. Generally, the generated electrons contribute more to the net charge of the beam than the positive ions so that the net effect is to neutralize the beam by decreasing the positive charge of the beam. As a result, the neutralized beam is easier to transport, the beam current is reduced, the uniformity is improved and the build up of non-neutral beams on the wafer surface is reduced by the claimed ion implantation systems and methods.

Vella is relied upon to disclose a charge transfer ion source system. The system includes a two-chamber configuration 24 of a Bernas source and a top plate 28 including an extraction aperture 18 through which ions are accelerated into an acceleration region 38 as illustrated in Fig. 2. Also, a plasma source gas feed 40 receives a plasma forming gas that is input into a plasma chamber 30. Aitken is relied upon to disclose a system for implanting ions into a target element. An extraction electrode 237, a fringe electrode 236 and a ground or deceleration electrode 238 are provided as illustrated in Figs. 35-41 of Aitken. In contrast to claims 1, 16 and 22 of the present application, Vella fails to disclose a second neutralizing gas supply for neutralizing the space charge of the ion beam. Aitken fails to disclose supplying such a neutralizing gas and therefore does not cure the deficiencies of Vella. Accordingly, it is respectfully submitted that claims 1-9, 11, 12, 16-20, 22, 25-28, 30 and 31 patentably define over Vella and the combination of Vella and Aitken and it is respectfully requested that these rejections be reconsidered and withdrawn.

Claims 13-15, 21, 23, 24 and 32-34 stand rejected under 35 U.S.C. § 103(a) by Vella in view of U.S. Patent No. 5,814,819 to Sinclair et al. This rejection is respectfully traversed.

Claim 21 of the present application recites an ion implantation system comprising a dopant gas supply, an ion beam source, an extraction electrode and a secondary gas supply for neutralizing the space charge of the ion beam. Sinclair et al. is relied upon to disclose an ion beam neutralizer using water vapor as the neutralizing medium. At col. 2, lines 15-17 of Sinclair et al., gaseous nitrogen, argon, neon or xenon are disclosed as being introduced into the implanter beamline at the mass analysis magnet. However, the Sinclair system reduces the current levels of the ion beam in low energy conditions. Sinclair et al.


recognizes the ineffectiveness of nitrogen bleeding but does not suggest one gas source for introducing the dopant gas and a secondary gas supply for neutralizing the gas in a region defined by the extraction electrode as recited in claim 21 of the present application. As a result, Sinclair et al. does not suggest or imply positioning the secondary gas supply for neutralizing the space charge of the ion beam in a region defined by the extraction electrode and therefore fails to cure the deficiencies of Vella. Accordingly, it is respectfully that claims 13-15, 21, 23, 24 and 32-34 patentably define over the combination of Vella and Sinclair et al. and it is respectfully requested that this rejection by reconsidered and withdrawn.

For all of the above stated reasons, it is respectfully submitted that all of the outstanding objections and rejections have been overcome. Therefore, it is respectfully requested that claims 1-9, 11-28, and 30-34 of the present application be passed to issue.

If any issues remain unresolved, the Examiner is requested to telephone the undersigned attorney.

Please charge any additional fees or credit any overpayments to deposit account No. 50-0896.

Respectfully submitted,
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